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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/773,523	02/02/2001	Chun Chen	M4065.0390/P390	6271

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EXAMINER

BEREZNY, NEAL

ART UNIT

PAPER NUMBER

2823

DATE MAILED: 01/22/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/773,523

Applicant(s)

CHEN, CHUN

Examiner

Neal Berezny

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 December 2002.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7, 9-14 and 16-50 is/are pending in the application.
- 4a) Of the above claim(s) 25-50 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7, 9-14 and 16-24 is/are rejected.
- 7) ☒ Claim(s) 23 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 December 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 02 December 2002 is: a) ☒ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Drawings

1. Examiner acknowledges applicant's corrections to the drawings and is deemed acceptable.

Claim Objections

2. Claim 23 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. The parent claim already contains the limitation that the second doped layer is provided after the first doped layer, and therefore the dependent claim is not further limiting the parent claim.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-7, 9-14, and 16-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. (5,482,881) as applied for claims 20-22, 24 above. Chen teaches a method of forming a source region in a substrate, fig.3, el.300, fig.1, el.132 and 116, comprising forming a pair of gate structures which extend in a first direction

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over a substrate, el.700, altering the upper surface profile of said substrate to form alternating areas of higher substrate surface elevation and areas of lower substrate surface elevation along said first direction and between said pair of gate structures, fig.3, el.300, providing a first doped layer in said substrate between said gate structures, which has a profile which follows that of said upper surface profile and providing a second doped layer in said substrate between said gate structure, which is below said first doped layer and which has a profile which follows that of said first doped layer, fig.4d, el.130, wherein at least one of said areas of higher and lower substrate surface elevation is doped by said first doped layer to act as a source region of a transistor, fig.3, el.300, wherein said area of higher substrate surface elevation acts as a source region, fig.3, el.300, wherein said second doped layer is provided in said substrate before said first doped layer, col.6, ln.55-63. Chen also teaches a method of forming a plurality of dopant pockets on a substrate, fig.1, el.130, 116, comprising forming a plurality of implantable regions on said substrate separated by field oxide regions, Fig.3, el.300, said implantable regions and field oxide regions extending in a first direction, forming a plurality of word lines located over said implantable regions and field oxide regions, el.700, said word lines extending in a second direction perpendicular to said first direction, selectively etching, col.6, ln.55-60, and removing portions of said field oxide regions between two adjacent word lines to expose respective substrate regions, el.302, col.6, ln.16-22, forming source regions in said implantable regions, fig.4d, el.132, co.7, ln.1-5, implanting a dopant into said substrate through said respective substrate regions to form said dopant pockets beneath said source regions, el. 130, col.6, ln.55-

63, wherein said dopant is a n-type dopant, col.6, ln.55-60, wherein each of said word lines is formed of a gate stack comprising a gate oxide, a floating gate, a dielectric formed over said floating gate, and a control gate formed over said dielectric, el.120, 122, 124, and 126, wherein said act of implanting said dopant is carried out with an implanting energy higher than implanting energy used to form said source regions, col.6, ln.55-63, said act of implanting said dopant employs directing said dopant through said substrate region at an angle of substantially 90 degrees incidence to said substrate region, fig.6c, el.MDD1, wherein said act of implanting said dopant employs directing said dopant through said substrate region at angles different than substantially 90 degrees incidence to said substrate region, fig.8d, el.MMD1, wherein said act of implanting boron into said substrate is carried out after said act of removing said field oxide material, fig.3, el.302,130.

5. Chen does not appear to specifically state that said act of implanting said dopant into said substrate is carried out after said act of forming said source regions, nor the use of a p-type dopant, such as Boron, nor employing a BF_2 dopant source. Chen does teach the use of a generic "first conductivity type", col.11, claim 4, thereby suggesting to one skilled in the art that Chen anticipated the use of both N-type and P-type dopants. It is well known in the art to use different dopant types to build both NMOS and PMOS devices by using both types of dopants, in order to build CMOS devices having lower power consumption. Further, it is well known in the art that Boron is commonly used as a P-type dopant and that BF_2 is a well-known dopant source. It would be obvious to

one of ordinary skill in the art at the time of the invention to use boron and BF_2 for a P-type dopant because of its compatibility with silicon crystal structure as a doped semiconductor. Finally, it would be obvious to one of ordinary skill in the art at the time of the invention to change Chen's order of implants from deep and then shallow to shallow and then deep. Both methods are well known in the art to be equivalent processes and a skilled artisan would be motivated to employ either method in order to provide greater process latitude when building and designing a process for peripheral devices that may require a shallow implant first so that a masking or etching step could be performed prior to the deep implant, thereby allowing the same implant to be performed on both devices reducing process steps and costs.

Response to Arguments

6. Applicant's arguments filed 12/02/02 have been fully considered but they are not persuasive. Further, Applicant's arguments with respect to claims 20-22 and 24 have been considered but are moot in view of the new ground(s) of rejection. Applicant was silent on examiner's objection to claim 23, nor was the claim amended.

7. Applicant argues that the amended claims contain the limitation of providing the shallow source implant first and then the second deep source implant, thus the second implant having a higher energy than the first. Further, applicant asserts that Chen implants As while applicant implants boron. Applicant also asserts that Chen does not provide a doped pocket under the source, nor that the implant energy of the second

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doped layer is higher than the first, see p.7 and 9 of the response. Applicant's interpretation of Chen is significantly different than that made in the rejection. Applicant is reminded that the reference needs to be interpreted as broadly as reasonably possible in order to reject the claims, and not to find a single interpretation that the claims may overcome. To reiterate the rejection, Chen teaches a source, fig.1, el.132, and a pocket, el.130, under the source. Therefore, Chen does form a doped pocket, with the pocket implant having a higher energy than the source implant.

8. With regard to the other allegedly missing elements, the rejection clearly identified them as being well known in the art. Since applicant was silent on the previous action regarding said official notice and /or statements regarding well-known features and/or processes, such silence constitutes applicant's admission of prior art. Applicant is reminded that a rejection need not contain every element, if the element is well known in the art. See MPEP 2144.03 and *In re Zurko*, 258 F.3d 1379, 59 USPQ2d 1693 (Fed. Cir. 2001).

9. To further expedite prosecution of this case, examiner provides the following reference to applicant, as evidence of the notoriously well known features asserted in the examiner's rejections. Gardner et al. (6,127,235) teaches the source implant first and then the pocket implant second, fig.1d and 1f, el.122 and 152, respectively, col.4, ln.61-66, and col.5, ln.20-27. Further, Gardner teaches the interchangeability of P-

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channel and N-channel device processes, clearly identifying the use of boron dopant, col.8, ln.13-16.

CONCLUSION

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Neal Berezny whose telephone number is (703) 305-1481. The examiner can normally be reached on M-F 9:00 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on (703) 306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are (703)

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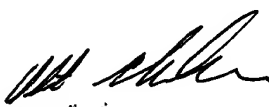
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308-7724 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

NB

January 16, 2003


Olat Olat
Supervisory Patent Examiner
Technology Center 2800